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Research Study

Managing Nuclear Proliferation: The Politics of Limited Choice

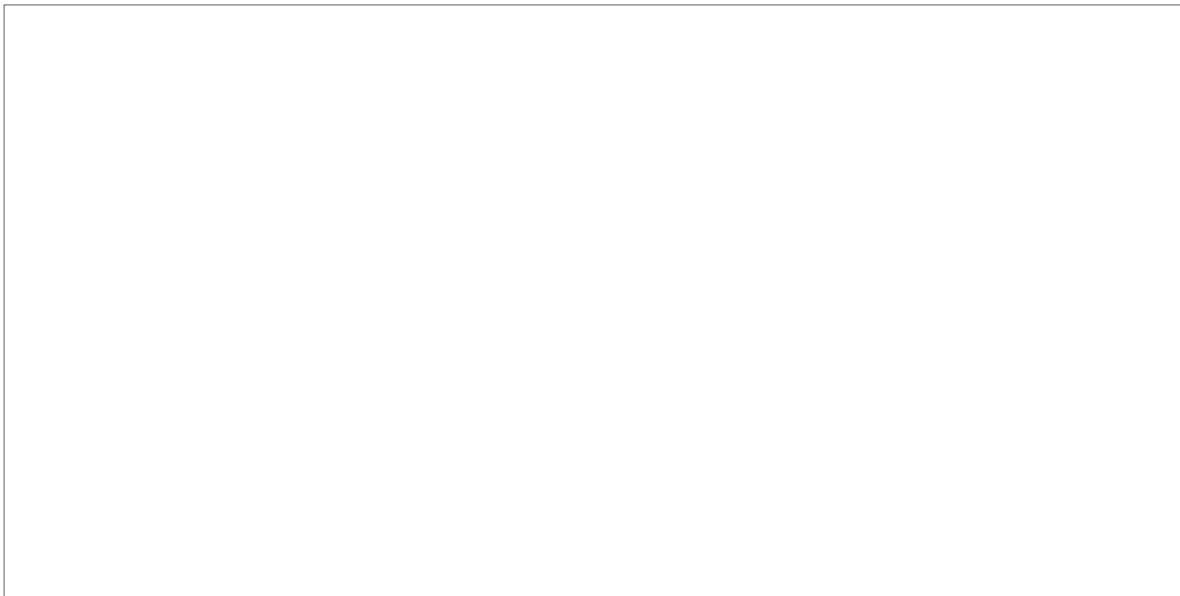
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CENTRAL INTELLIGENCE AGENCY

DIRECTORATE OF INTELLIGENCE
OFFICE OF POLITICAL RESEARCH

MANAGING NUCLEAR PROLIFERATION:
THE POLITICS OF LIMITED CHOICE



December 1975

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NOTE

The purpose of this paper is, first, to examine the political and technological forces underlying the dynamics of nuclear proliferation (both horizontal proliferation -- more countries with some nuclear capability, and vertical proliferation -- the advance, through definable stages, to increasingly sophisticated nuclear capabilities). And then, to survey the avenues open to the Great Powers if one or more wish to limit and contain the process of proliferation.

The discussion is based on two underlying assumptions which constitute its basic parameters: that nuclear proliferation, in its current stage at least, is largely a political phenomenon and as such is strongly influenced by the growing atmosphere of confrontation between the developed and less-developed countries; and secondly, that, while nuclear proliferation is uniformly undesirable, some of its potential aspects are considerably more dangerous and more avoidable than others.

This analytical essay was prepared by the Office of Political Research. It was discussed with representatives of other interested offices in CIA but was not formally coordinated. It does not represent an official CIA position on this topic. While the author is no longer with this office, questions or comments on this paper are welcome. They may be directed to code 143, ext. 5441.

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SUMMARY

During the past decade nuclear politics between developed and developing states have been guided by the premise that civilian nuclear energy resources could be distributed around the globe while military nuclear resources were restricted to a small group of major powers. This assumption is now being challenged as rapidly as the civilian/military distinction in nuclear resources is fading. It seems unlikely that or any major power can prevent the emergence of more nuclear explosives states because:

- the requisite materials and technology are already too widely available for technical safeguards and international regulations to be effective.
- competition among the nuclear supplier states guarantees threshold states that diverting and diversifying power programs into explosives programs will not deny them a source of nuclear materials or technology.
- legal restraints on proliferation have lost much of their effectiveness because of the growing political confrontation between industrialized and less developed countries.

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-- political pressures against proliferation only
tend to confirm the view that the nuclear-leaves are
trying to deny all other countries a valuable prize.

Once a state crosses the threshold of nuclear explosives it
faces numerous successive thresholds of weaponization and delivery
ranging from crude bombs to sophisticated packaging, aircraft de-
livery, and various levels of missile delivery systems. The price
of effective nuclear weapons capability is considerably higher --
in terms of economic, technological and security considerations --
than producing a test nuclear explosion. Many of the states which
acquire explosives may not choose or be able to cross these successive
thresholds. Thus, it may prove more feasible and more important to
discourage or delay states from advancing across these thresholds --
by decreasing technological opportunities and political incentives --
than to prevent them from acquiring explosives.

The future is, therefore, likely to be characterized not only
by an increased number but also an increased diversity of nuclear
actors. These will include nuclear superpowers, regional nuclear
powers, nuclear abstainers, closet nuclear powers, nuclear explosives
powers, and, possibly, nuclear terrorists.

The more states that stop at the explosive stage the greater
the prospects that the proliferation process will not seriously

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alter international power relations. The best hope for managing nuclear proliferation is that most of the new nuclear explosives states may be persuaded that weaponization is insufficiently valuable or too costly to warrant embarking on a full weaponization program. The most dangerous prospect for future proliferation would be a condition of high political incentives and high technical opportunity when today's threshold states are tomorrow's nuclear explosives powers and must determine whether they will move to full delivery systems. The coming decade of nuclear politics would then result in moving the ante up from nuclear explosives to effective nuclear weapons.

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DISCUSSION

1. FURTHER PROLIFERATION SEEMS INEVITABLE

The process of nuclear proliferation began when the US lost its nuclear monopoly in 1949 and would logically and conclusively be completed only when all political actors, state and non-state, are equipped with nuclear armaments. The proliferation process involves not only acquisition of nuclear military resources by additional actors, but also readjustments by the international community; each new nuclear power in some way redefines the equations of international influence. Although nuclear weapons have not been used militarily since 1945, they have been in continuous passive, political use -- it is, in fact, the value of their political use which seems to be the primary incentive to the current class of nuclear threshold states to acquire nuclear status.

Acquisition of nuclear explosives promotes a state's position relative to allies and rivals, increases its international influence, and alters its self-image. Even when there is no threat of military use of the new nuclear resources, their political impact upon other states is a source of instability until initial reactions and readjustments are completed. Domestically, the emergent nuclear power requires time to get used to living with what it has built, and to form a consensus on the use and development of its new resource.

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Thus far in the proliferation process, the emergence of new nuclear powers has been gradual and widely anticipated. This in turn has allowed time for the international system to adapt to their presence. The first four nuclear initiates were also established powers reinforcing their status rather than LDCs attempting to augment their influence. From 1945 to 1964 -- what may come to be known as the first phase of nuclear proliferation -- the process was held to a stately pace. Four years passed between Nagasaki/Hiroshima and the Soviet Union's first nuclear test in 1949. Britain became the third nuclear power in 1952 and another eight years passed before France became the fourth in 1960. Another four years passed before China made its nuclear debut in 1964.

An apparent plateau in the proliferation process was established -- an equilibrium period when there seemed to be no more states with both the political incentive and the technical opportunity to advance to nuclear status. Each of the major powers and victors of World War II had acquired nuclear weapons. All the other technically advanced states capable of developing their own nuclear armaments lacked incentive. The former major Axis powers, Japan and Germany, were disqualified by historical, domestic, and international restraints. Canada, Sweden, and Italy preferred

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the roles of nuclear abstainers. Israel also gave the appearance of abstaining for both political and technical reasons.*

India's detonation of a nuclear device in 1974 ended this equilibrium and probably initiated a second phase of nuclear proliferation, a phase quite distinct in pace and variety of nuclear actors. The Indian experience illustrates the technological and the political reasons why further nuclear proliferation seems inevitable.

Diffusion of Technology

Fifty states now have some kind of civilian nuclear power installation. They fall, however, into a number of very different categories: nuclear superpowers (the US, USSR, China, etc.), nuclear explosive states (India); nuclear abstainers (those who have the means and the technology to go nuclear but have not decided to do so such as Canada, Japan, and Sweden); nuclear threshold states (countries considered likely to be able and willing to explode test devices within a relatively few years like Taiwan, Brazil, Iran); and Israel which prefers to maintain an ambiguous nuclear military status.

Thirty years after Big Boy and Fat Man were developed in great secrecy, their technology is no longer secret. And after

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fifteen years of an expanding nuclear power industry which uses and produces enriched uranium and plutonium, these are no longer rare or unattainable elements. Moreover, the technological opportunity to cross the explosives threshold can only increase as nuclear materials and know-how become ever more available and as nuclear power installations continue to evolve towards similarity with the technology needed to make nuclear explosives.

Even now, the technological distance between power plants and explosives is so short that many threshold states are at approximately the same lead-time from the capacity to make explosive devices. There is considerable danger that they might be drawn into an accelerating competition to be among the earliest to cross.

Lead-times are primarily a function of the status of existing national nuclear power industries and of the international availability of nuclear technology. The technology of nuclear power industries is expected to change over the next several years. Most of the expected developments would bring nuclear power technology closer to the threshold of nuclear explosives technology. The international availability of nuclear technology should also be expected to increase over the next several years, despite the efforts of supplier states to restrict their exports of nuclear technology which could be applied toward

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explosives programs. Thus, the lead-time for an oil-rich state such as Libya, which has no established nuclear power industry, but almost unlimited funds for purchases, might also be expected to shrink over the next few years.*

Taiwan, the Republic of Korea, Pakistan, Argentina, Brazil, Libya, South Africa, Iran, Egypt, and Spain, constitute the current class of threshold states and each could conceivably graduate to nuclear explosives by or before 1985. This is a highly diverse group, ranging from Taiwan which has a complete nuclear power industry and highly trained nuclear physicists to Libya which has neither, but may have the resources and the political commitment to acquire both very quickly. All, however, possess the potential, and possibly the incentives, to cross the explosives threshold within the next ten years.

India's route to an explosive capability involved acquiring the technology and materials through foreign (in this case Canadian) aid, diverting the essential resources for an explosive device, exploding it and issuing a declaration that it was for peaceful purposes only. Canada promptly suspended further help and has prolonged negotiations on renewing assistance, demanding increased bilateral safeguards. If Canada continues to refuse aid, however, India

*Lead-times for the nuclear abstainer states -- Japan, West Germany, Italy, Canada, and Sweden -- would, of course, be quite short if they were to reverse their present policy.

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will look to one of the other states which export nuclear power technology and/or enriched uranium: France, West Germany, the UK, the US, the USSR and Sweden.*

Commercial Competition Among Exporters

Competition among five nuclear supplier states is a further guarantee to other threshold states that diverting and diversifying power programs into explosives programs ultimately will not deny them a source of nuclear materials or technology. The dynamics of nuclear exports are in general far more commercial than diplomatic. Such exports are a major international industry which international suppliers may gross \$40 to \$50 billion during the next five years. Sales of uranium and uranium-enrichment services may earn several billion dollars more.** Although oil prices have been blamed for the increasing demand for reactors by LDCs,

*South Africa, which has natural uranium deposits and is developing its own enrichment process, expects to become an exporter of enriched uranium in the near future. Pretoria is considering whether it will adhere to the Non-Proliferation Treaty before becoming a nuclear exporter. Its decision will undoubtedly be influenced by concerns that inspections not reveal its secret and supposedly unique enrichment process. South Africa has, however, suggested list prices for its enriched uranium considerably above current market prices. If the product were to be unsafeguarded, it might be worth the additional expense for some consumers.

Italy and Japan also plan to become full-scale nuclear supply exporters in the near future.

**These estimates are derived from projections by the Organization for Economic Co-operation and Development.

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It is probably more significant that oil price increases have heightened competition among nuclear exporters. These highly industrialized states are also the major oil importers and almost all of them have recently made efforts to increase exports of nuclear technology and materials as a means of supporting their balances of payments.

As LDCs acquire more nuclear power plants, they are becoming increasingly interested in obtaining additional parts of the nuclear fuel cycle that would limit their dependence upon the half-dozen major suppliers -- and, incidentally, give them a capacity to produce plutonium. The recent contract between West Germany and Brazil is a case in point. In order to complete this multibillion-dollar agreement, the Germans consented to what the US government had refused -- the sale not only of reactors but also of enrichment, reprocessing, and fuel fabrication facilities which would be capable of processing plutonium from spent fuel. Argentina is now negotiating with Canada and France for heavy water reprocessing facilities. Meanwhile, the French are negotiating a massive, multibillion-dollar nuclear assistance program in Iran and are discussing another reprocessing facility for South Korea.

Against these competitive economic pressures, nuclear exporters' efforts to introduce mutual restraints which would make their products less susceptible to being used as a short-cut to

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nuclear explosions have been paltry. LDC consumers have successfully played nuclear suppliers against each other and opposed any regulatory efforts by suppliers, labeling such efforts a cartel action intended to exploit them financially and to deny them sovereign control over installations on their own territory.

The Political Incentives to Proliferation

In its present context, nuclear proliferation is largely a political phenomenon made possible by technological diffusion. With the exception of Spain and South Africa, all the threshold states are LDCs at various stages of underdevelopment. Thus, proliferation is one of the many global issues that are strongly affected by the confrontation between developed and less developed states. A test nuclear explosion, especially since India proved an LDC could achieve it, is coming to be regarded as a relatively quick and inexpensive means of gaining international attention and prestige.

While a relatively short technical gap exists between civilian nuclear resources and a nuclear explosive capacity, the difference spans a wide political gulf. "Going nuclear" places a state among a still select group. The token nuclear explosion -- quite apart from military considerations where its utility is minimal -- is a valuable credential of international status. As India's experience demonstrated to the threshold nuclear powers,

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the rewards are quite high. Regionally, India at least alarmed Pakistan. Globally, India bolstered its international prestige at least among non-aligned nations. Internally, the government strengthened its position with a highly visible achievement, gaining credit with the military and popular support.

The Indian case also demonstrated that political costs are low. Internationally, criticisms were few and brief. No official rebuke came from either Asian nuclear power, China or the USSR. Pakistan was naturally the most outspoken critic, but undercut the force of its moral indignation with the announcement that it too would require a nuclear capability. Many other developing countries quietly welcomed the Indian demonstration that one of their number could accomplish a technical achievement formerly reserved only to the major powers. Even Yugoslavia, one of the more conservative non-aligned nations, congratulated India. The strongest criticisms by Non-Proliferation Treaty (NPT) parties came from the nuclear abstainers -- Japan, Sweden, and Canada -- all developed countries.

From the viewpoint of LDCs, all nuclear resource issues are colored by an overlay of North-South tensions. In an international climate in which developing states put a high premium upon anything they perceive to be an equalizer of their positions against the major powers, national nuclear power programs have become a

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symbol of sovereignty. Nuclear explosives may soon fall into a similar category since many threshold states see acquisition of nuclear explosives as technically possible and politically advantageous.

There is relatively little the major nuclear powers can do to change this assessment. The materials and technology are already too widely available for technical safeguards and international regulations to be effective. Political pressure against proliferation often tends only to confirm the view that the nuclear-haves are trying to keep a valuable prize from the have-nots.

The NPT Is Questionable

The NPT and the International Atomic Energy Agency (IAEA), the chief instruments for restraining proliferation,* are more victims of, than antidotes to, this tension. LDCs increasingly suspect what they see as the NPT bargain: non-nuclear weapons states renounced acquisition in exchange for the assurances of

*Other major treaty instruments include the Limited Test Ban Treaty (1963); Treaty for the Prohibition of Nuclear Weapons in Latin America (1968); Seabed Arms Control Treaty (1971); "Accidents Measures" Agreement (1971); "Hot Line" Modernization Agreement (1971); Anti-Ballistic Missile Treaty (1972); Interim Agreement (Limitation of Strategic Offensive Arms [1972]); ABM Protocol (1974); Threshold Test Ban and Protocol (1974). It should be noted that except for the 1968 Latin American treaty, these agreements focused on vertical proliferation among the major nuclear powers rather than on horizontal proliferation to new nuclear states. Although the 1963 Test Ban Treaty was originally intended to restrain both forms of proliferation, in application has been concerned almost exclusively with vertical proliferation.

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nuclear weapons states that the latter would check their nuclear armaments race and provide civil nuclear power resources to the non-nuclear weapons states. China, France, and such Nth* countries as India, Brazil doubted the value of this pact when it was signed in 1968 and refused to join. Others agreed only after the inclusion of an article providing that they may withdraw with two years notice.

The history of the treaty since then has done little to reassure the reluctant and to attract signatures of the threshold states. The most important threshold states that have still not signed are: Brazil, Argentina, South Africa, Pakistan, Taiwan, and Libya. Few threshold states, parties or not, now believe that they will be denied nuclear technology if they do not abstain from weapons under the terms of NPT. This aspect of the bargain has been further eroded by the lessening technical distinction between civil and military nuclear resources.

What the LDCs see as the failure of the superpowers to check their arms race has also reinforced the LDC view that they surrendered sovereign security rights and foreswore weapons which would help equalize their positions against the major powers without

*Nth State means any one of a number of potential proliferators.

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compensation. Nothing less dramatic than a major advance at the Strategic Arms Limitation Talks or conclusion of the Test Ban Treaty is likely to alter this perception. One of the chief weaknesses of the NPT is that it has become identified with superpower hegemony. And as long as LDCs interpret the NPT as an instrument of such hegemony, they will not consider it as a binding international treaty.*

North-South stresses on the NPT are further accentuated by the fact that the treaty as a global arrangement is quite naturally debated and reviewed in global forums where confrontation between developed and developing states is the single most pervasive theme. Debates within the UN General Assembly and the UN's conference of the Committee on Disarmament quickly assume the atmosphere of confrontation between LDCs and developed countries (DCs); and they become debates between nuclear have-nots and nuclear-haves. The 1975 NPT Review Conference illuminated LDC dissatisfaction with the nuclear policies of the superpowers: its predominant theme was that DCs have failed to check their own, more dangerous, nuclear armaments race, while insisting upon LDC non-proliferation.

*Hedley Bull has elaborated this point in his article "Rethinking Proliferation", International Affairs, London, April 1975, pp. 175-189.

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Safeguards Are Weakening

As an instrument of technological restraint, the IAEA has fared only slightly better. Born in 1957 out of the US Atoms for Peace program, the agency has two roles: a conduit for peaceful nuclear assistance and an administrator of safeguards designed to ensure that nuclear materials will not be diverted from civilian programs to weapons programs. The functional division has become a political division: LDCs are most interested in assistance programs while the major powers are most concerned with safeguards. The LDCs' perception of safeguards as primarily of benefit to the major powers is reflected in annual budget battles in which the LDCs hold safeguard funds hostage for increased assistance programs. This view naturally creates difficulties for the safeguards program which is highly dependent upon the cooperation of the LDCs.

Given the political and technical limitations of attempting to regulate installations within states' sovereign territory and to account for materials moving through a complex industrial process, the safeguards system accomplishes as much as possible -- it makes diversion slow and unpolitic. IAEA inspectors conduct regular, scheduled inspection tours of all nuclear power installations which recipient states have attained under safeguards agreements. If evidence of a diversion of materials is found - a technically difficult

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determination -- a report is made to the Board of Governors.* This elected body must then decide whether to recommend a public announcement of nuclear diversion. The safeguards system is not a lock but a burglar alarm, and the alarm has never yet sounded. Its deterrent strength depends on recipients' anticipation that it would sound if violations were detected and that the consequences would be so costly as to outweigh the advantages of obtaining the raw materials for nuclear explosives. The IAEA safeguards system makes a policy of clandestine diversion from civilian to explosive technology a little more difficult, a little slower and much less politically convenient. It does not, however, preclude slow, discreet diversion or a policy decision to divert materials openly and accept the consequences. In part because the IAEA has been effective as a conduit for nuclear energy technology, the Agency's bargain -- like the NPT bargain -- of industrial assistance for military abstinence cannot be expected to completely counteract the political incentives to acquire nuclear explosives.

* A power plant's nuclear materials accounts are not expected to be in perfect balance -- some nuclear materials are inevitably lost in normal operation processes. Hence, the acronym MUF: materials unaccounted for. The cumulative MUF at a large fuel-fabricating plant can amount to dozens of kilograms a year. See John McPhee, The Curve of Binding Energy, New York: Farrar, Straus, and Giroux, 1974, p. 64. The technology of safeguards is also improving and although the MUF problem will never be eliminated, it may be minimized in the future. IAEA safeguards are not in any way, however, intended to encompass the problems of physical security against terrorists.

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There is little that could be done to make either the NPT or the IAEA more potent instruments of restraint on nuclear proliferation. Their limitations are not so much in the institutions themselves as in the conditions of nuclear politics. After thirty years in which nuclear weapons have dominated international politics as a touchstone of power, LDCs will not be persuaded that their own leverage would not be increased by possession of that touchstone; nor will they be bound by the NPT or any agreement to forego that talisman when it seems so cheaply attainable.

II. THE MANY FORMS OF PROLIFERATION

There are many decision "thresholds" for states on the way from non-nuclear status to full-fledged nuclear weapons. Each technical threshold, from test explosion, to crude bombs, to sophisticated packaging and delivery is increasingly more difficult and expensive, and not necessarily more effective politically. Hence, the future is likely to see an increase in the variety of nuclear actors.

The price of admission to the circle of militarily effective nuclear powers is considerably higher -- in terms of economic, technological, and security considerations -- than that of producing a test nuclear explosion. Sophisticated offensive and defensive nuclear delivery systems are currently -- and will most likely continue

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to be over the next decade -- beyond the means of most Nth states, even those which make the decision to acquire nuclear explosives. Given the state of nuclear weaponry, the necessary investment for threshold states to acquire a serious nuclear weapon capacity is now in many ways relatively greater than the entry costs were for the original five nuclear powers. Few of the current class of threshold states could afford even a limited regional missile delivery system without strenuously disrupting their national economy. Neither do they have an adequate technological base and, unlike the nuclear power industry, operation of a nuclear weapons delivery system is not amenable to total reliance upon foreign technology and technicians. A nuclear delivery system in its early stages without adequate defenses is also likely to be more of a target and a liability than an asset to national security.

An additional political disincentive to developing a nuclear delivery system is that this might touch off a regional arms race of the most expensive kind. The cost to the nations involved might be the diversion of vast sums of money from pressing modernization needs without any appreciable gain in regional security or prestige since no country would achieve a long lasting military edge. A further deterrent against the use of a nuclear weapon against a regional competitor would be the difficulty of containing the effects of a nuclear attack within the target country.

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For such reasons many new nuclear explosives states might -- in a conducive international climate -- conclude that weaponization is insufficiently valuable or too costly to warrant embarking on a full weaponization program. If sufficient nuclear explosives states came to such a decision, an equilibrium -- such as the equilibrium that prevailed between 1964 and 1974 -- might be re-established.

A key factor will be the pace at which the Nth states cross the nuclear explosives threshold. The more widely spaced and generally anticipated their nuclear debuts, the greater are the chances that a general equilibrium can be achieved. One of the most destabilizing aspects of proliferation over the next decade is the rapidity with which one threshold state could follow another to nuclear explosives. For this reason, as various commentators have noted, the transition phase of the next decade may be more unstable than the nuclear politics it eventually produces.

A chain of successive Nth states demonstrating explosives would probably increase the prospects not only for regional but also for global competitive momentum. But such a surge would, at the same time, dilute the prestige and political benefits previously attainable by testing a nuclear device. A world accustomed to the repeated sight of third and fourth rank states conducting nuclear tests might cease to recognize this act as an insignia of unique political status.

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The "nuclear club" would quickly become either a far larger and less select group, or its standards of admission would be substantially raised. In the latter case, the nuclear threshold would be raised from explosives capability to some index of delivery capability; current political incentives to test explosives would be replaced by incentives to weaponize.

Political incentives apart, the technical requirements will probably remain a hurdle for most of the threshold states that might contemplate advancing beyond simple explosive capabilities.* Some may find it insurmountable and remain, of necessity, nuclear explosives powers. All will have to make a political decision, after acquiring explosives, as to whether to attempt to develop a weapons capability. At this juncture they will also have to consider the costs, benefits, and feasibility of attaining an effective nuclear weapons force.

In general terms, development of a weapon from an explosive device requires that it be made portable and deliverable. The device must first be packaged properly for delivery. This packaging is a state of the art which is several degrees removed from the capacity to detonate a non-mobile test device under laboratory conditions

* Much of this discussion of weaponization is drawn from contributions by [] of the Office of Scientific Intelligence, CIA, who provided both information and analysis of alternative nuclear delivery systems.

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within national territory. Although additional time and costs would be involved, a state which possessed a nuclear explosives capacity would presumably be technically capable of packaging the device. Ignition devices required for deliverable nuclear explosives are considerably more complex than those necessary for a stable test explosion. If the Nth state wished to possess more than a very limited number of weapons, it would have to face the difficulties of electrical-mechanical, nuclear, and high explosives component production.

Assuming that a nuclear device of reasonable size and portability is achieved, the Nth state has three options for delivery: unconventional vehicles (such as trucks or ships), airplanes, or missiles. Unconventional vehicles would seem to have far less utility for states than for non-state actors such as terrorists. The political prestige and deterrence strength of such delivery systems -- two primary values of nuclear weapons for states -- would be small. Reliability and control would also be extremely limited with such primitive delivery methods. But, commercial marketing of compact explosives could eventually alter these judgments. For the present, however, miniaturized nuclear weapons involve very advanced technology and will probably not be available to this generation of Nth countries.

Aircraft delivery is a far more attractive alternative for most new nuclear states: it is available, reliable, and accurate and may well become the most common delivery system among Nth states. Aircraft

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with adequate range and payload capacity to meet most Nth countries' needs would not be difficult for any of them to acquire. In fact, if enemy air defenses were not a problem, any reasonably large aircraft could be used to carry nuclear weapons. Use of aircraft allows accurate bomb delivery, thereby eliminating the need to solve the difficult problems associated with developing highly accurate missiles. Unlike missiles, an aircraft-based nuclear weapon system would require little systems testing -- a definite advantage in terms of minimizing both development time and detectable indicators to potential adversaries.

As already indicated, for any given Nth state, the effectiveness of its aircraft delivery will depend almost completely on the quality of its enemy's air defenses. For targets with no air defenses, any aircraft with sufficient range and payload capability would do. For targets with defenses ranging from antiaircraft guns to manned interceptors, modern military aircraft would be required. A target country with surface-to-air missiles (SAMs) would pose entirely different kinds of penetration problems and impose new requirements on the aircraft. The problem becomes far more complex when mobile SAMs are present and when various kinds of electronic warfare devices are introduced.

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Nth countries would initially have a very limited number of nuclear devices available and would, therefore, have to identify a few high priority targets to attack (or threaten to attack if the nuclear weapons are intended primarily for deterrence) and acquire delivery systems that could penetrate anticipated air defenses with confidence. Their assessments of the reliability of prospective delivery systems would have to take into account not only existing defenses but also those that might be instituted in response to their new nuclear capability. Superpower indications of willingness to supply such defense systems could be one means of influencing these assessments.

Missiles, the most sophisticated delivery system, would solve the Nth country's penetration problems, but they involve, much more complex and time-consuming technical problems. Accuracy, in particular, is quite difficult to achieve without long lead-times and testing programs. They also represent a quantum jump in the economic resources that would have to be devoted to the nuclear program. Some Nth countries might have sufficient technical and financial resources to overcome these obstacles and achieve short-range regional deliveries; many would not. In any case, this generation of Nth states would not be capable of going beyond these relatively short operational ranges in the near future.

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For longer-range missiles a far higher level of expertise in virtually every area of technology is required and many of the typical developmental problems require time and experience to solve. Even countries such as India and Japan, which now have a technological base adequate to develop ICBMs, have experienced unexpected difficulty in related but technologically simpler projects such as developing space launch vehicles. Similarly, the Chinese have had continuing problems with their ICBM program.

The advent of long-range strategic cruise missiles could substantially alter this picture at some future point. Given adequate guidance and propulsion technology, strategic cruise missiles appear to be much easier to acquire and employ than long-range ballistic missiles for either state or non-state actors. They would be mobile, easy to conceal, difficult to defend against (although not as difficult as ballistic missiles), and capable of carrying large nuclear payloads with sufficient accuracy for Nth country strategic missions. Furthermore, the component and subsystem technologies are likely -- in the absence of embargoes -- to be readily available to Nth countries. While cruise missiles' utility to superpowers may be limited, they would, in fact, be ideally suited as delivery vehicles for Nth countries. Their availability would significantly increase such states' prospects for survivable small nuclear forces, thus acting as inducements to proliferation.

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Further Complicating Factors

The most realistic expectation for the future is nuclear diversity. This diversity will almost certainly extend to, and be conditioned by, other aspects of military/political leverage. Uncertainty about these other forms of leverage severely constrains any predictions concerning the roll of military nuclear resources in international politics of the mid-1980s. For example, the proliferation of precision guided munitions (PGMs), may come to parallel the problem of nuclear proliferation. And the spread of nuclear weapons may be strongly modified by the dispersion or containment of PGMs. These are a generic class of highly accurate weapons which have a wide range of potential applications. Depending on how this technology develops and how it is employed, Nth countries may be either persuaded to or dissuaded from developing nuclear weapons.

PGMs will almost certainly become available on a meaningful scale first to the US and the Soviet Union, although other advanced nations have the technological base to develop them. If the superpowers were to make PGMs available to their client states, the use of force might become more acceptable under some circumstances since the high accuracy of PGMs can be used to minimize collateral damage.

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Faced with a PGM threat, Nth countries would have several options. One is to develop a local nuclear capability to engage either their PGM-armed neighbor or the tactical forces of its superpower patron. PGMs may turn out to be as difficult to acquire as nuclear weapons since many components are highly specialized (hardened inertial platforms, terminal sensors, etc.) and would be difficult either to develop or buy. Moreover, intent to develop such technology would be difficult to conceal because of the high level of specialized technology involved.

But, if PGM technology were to become widely available, very effective tactical (and regionally strategic) PGM weapons could be developed without the nuclear materials problem or the stigma associated with nuclear weapons, PGMs, thus, might provide Nth countries with an adequate incentive to forego nuclear weapons development. The deterrent value of nuclear weapons would be absent, but an adequate nuclear deterrent posture may be more difficult to maintain in the future even against a regional power armed with conventional PGMs.

For these and other reasons discussed above, it thus seems likely that a decreasing proportion of the Nth states will cross the successive thresholds beyond nuclear explosives, to weapons deliverable by aircraft, and then to nuclear-tipped missiles.

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III. THE SPECIAL CASES

Because of their unique characteristics, there are two cases of nuclear actors or potential nuclear actors to which most of the previous discussion applies only partially or not at all. Yet even here, there are incentives and disincentives that may offer some options to superpowers seeking to manage the proliferation process.

Nuclear Terrorism

The possibility of terrorists getting hold of nuclear weapons poses the most severe limitation on political efforts to manage proliferation. This is the most puzzling and extreme aspect of the potential diversification of nuclear actors. The same increasing availability of nuclear materials and technology which has made nuclear explosives accessible to developing states can also be expected sooner or later to bring them within the reach of terrorist groups. The incentives for increased status and recognition are also similar. Although chemical and biological weapons would be more easily available and capable of equal destruction, they would not have the political aura of nuclear explosives.

Because nuclear terrorists would, by definition, operate outside of official governmental processes, they are largely immune to international political controls. IAEA safeguards, for example, do not encompass provisions against terrorist removal of materials from a reactor complex. Restrictions on such groups'

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access to nuclear materials -- whether from reactors or commercial sources -- will depend on domestic regulations.

If a terrorist group does acquire nuclear explosives, it can rely upon the unconventional delivery methods which would be inappropriate for any but the most desperate or irrational state. Any form of transport -- airplane, boat, truck, or train -- could conceivably be employed. Unlike a state, terrorists with a mobile base of operations need not be concerned with the threat of counter-attack, hence they are not subject to the deterrence of defense systems that constrain states.

There are, however, sufficient systemic constraints against nuclearly-armed terrorists that non-state actors seem more likely to be an aberration than a characteristic of nuclear proliferation. These constraints are, however, largely dependent upon the policies and resources of host countries. Production or purchase of nuclear explosives would, for the foreseeable future, require resources available only to a very well-established and well-financed terrorist group. The "basement bomb" still requires rather complex laboratory facilities. The smaller the nuclear device -- and size would be quite important to a terrorist group which intended to rely upon unconventional and surreptitious delivery methods -- the more sophisticated the production requirements. Groups capable of finding such resources are likely to be

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the most institutionalized of terrorist organizations and the most sensitive to adverse public reactions. The more radical fringe groups that might be willing to use nuclear explosives would be less likely to have the necessary access to nuclear resources or expertise for packaging and employing them. While this restraint will diminish as nuclear resources become more widely available, it would seem to be a significant limitation upon non-state nuclear actors over the next ten years.

Assuming that some terrorist groups do acquire and employ nuclear explosives, it seems likely (but by no means certain) that their political impact on domestic politics will be greater than on international politics. A terrorist's nuclear explosion -- or even a credible threat of one -- would be far more disruptive to a municipality than to international relations. In many cases terrorists' demands are more likely to be fulfilled when directed against a single municipal authority than against one or more international actors who may or may not share competence to meet the demands.

Civil War

In a number of Nth states, where nuclear resources are becoming more readily available for unofficial as well as official actors and where abrupt changes in leadership are common, possession of nuclear explosives could become a major stake in

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competition for national control.* Civil wars historically have been particularly brutal and would seem to offer more opportunity for terrorist nuclear action than the international arena. If so, the main impact of substantial proliferation of nuclear explosives might be expected at the national level where it would seriously challenge the ability of central governments to coerce and hold sovereignty, rather than at the level of macro-distribution of power in international affairs.

The Middle East is also a unique region, where distances are short and sophisticated air defenses abound. The threat and expectation of hostilities, the strong and competitive superpower-client relations,

*Atomic bombs have reportedly already been a factor in internal political unrest in one nuclear power. The final military insurrection in Algeria occurred just before a scheduled detonation of a French atomic device. The French government apparently ordered that it be exploded several days earlier, to avoid the possibility of the bomb falling into the hands of the rebelling generals.

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and the highly sophisticated offensive and defensive systems in place severely complicate calculations of incentives and restraints applicable to threshold states in the area.

These characteristics peculiar to the Middle East set the region largely apart from the generalized discussion of the incentives and obstacles to horizontal and vertical proliferation discussed in sections I and II. While in other regions political calculations still tend to dominate, here where war is continually perceived as imminent, the military dynamics are crucial. They make the Middle East region more difficult to analyze and probably less susceptible to restraints or inducements proffered by major powers seeking to lessen the dangers inherent in the situation.

IV. MANAGING PROLIFERATION; LIMITED OPPORTUNITIES

Some aspects of nuclear proliferation are already beyond the control of the major powers, but since proliferation is a dynamic political phenomenon it is, and will remain, within their power to influence. Threshold-crossers' decisions will be strongly affected by what happens in the whole complex web of international relations -- North-South disputes, East-West relations, economic, technological, and military developments. Hence, if the major powers want to have an impact on the course of proliferation and on the variety of horizontal and vertical proliferation decisions that Nth states make, they will

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have a number of options open. Some are already visible, others will probably appear.

One of the prime objectives will probably be to delay and space out successive nuclear debuts to prevent or reduce the momentum of change. In many cases, traditional bilateral measures taken by a great power will tend to backfire or at least be costly in terms of other interests. If too much stress is laid on the dangers of proliferation to the threshold state as well as to general international equilibrium, such emphasis may be considered evidence to Nth states that, indeed, nuclear explosives are a highly desirable equalizer.

Most bilateral efforts will also involve policy interests other than the goal of restraining proliferation. Brazil, for example, has characterized the US concern over the Brazilian-German nuclear accord as the attitude of a self-satisfied superpower interested in maintaining the status-quo and in excluding newly-emerging powers from a larger share of political power.

Multilateral or bilateral, all efforts to prevent the proliferation of explosives will incur costs in terms of the major powers' other policy interests. Protesting the Brazilian-German nuclear power assistance agreement, for example, has adversely affected US relations with the largest of the Latin American regional powers. Dissuading South Korea from moving close to explosives capacity might require a

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major defense commitment which would incur not only political but also security costs. Such considerations would have to be weighed against the costs of a state's crossing the nuclear threshold. The immediate costs will vary with each set of bilateral relations and regional interests.

It seems probable, however, that in the short run such test demonstrations will not dramatically alter US or other major power relations with the state or the region. This has been the case thus far in the Indian experience. Whether these relations will be affected in the long-run is a separate question which will seem to depend in large part upon whether, or how quickly, the new nuclear explosives states advance to delivery systems and substantial nuclear weapons capabilities.

It may be possible to encourage self-initiated regional agreements to keep given areas nuclear-free. Arrangements which are formally initiated by LDCs themselves and not suspect as instruments of nuclear hegemony would seem to have the greatest prospect for effectiveness. At the present, however, these proposals are few and far from fruition. New regional nuclear-free zones and regional fuel reprocessing plants -- the two most prominent of such proposals -- are still in the planning stages and risk becoming pawns in the maneuvers of nuclear politics rather than restraints upon it.

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In Latin America, where both Brazil and Argentina fear a competitive nuclear armament race and do not have delivery methods readily available, increasing the political incentives to remain at test explosive capacity and reducing the technological opportunities to acquire delivery systems could be effective. Similarly in the Far East, where Taiwan must place more emphasis on the political rewards of recognized nuclear status than on any prospect of having a realistic deterrent capability against China, political measures would have considerable impact.

In terms of reducing the political attractiveness of nuclearization to the many LDC states near the threshold, removing proliferation politics from the context of North-South would also help restrain weaponization. The current overlap of relations between nuclear weapons states and non-nuclear weapons states with the DC-LDC antagonisms seriously undercuts efforts to manage or control proliferation. Limiting this co-identification -- and the implication that DCs are denying LDCs a potent attribute of sovereignty -- would work to reduce the numbers of new nuclear weapons states. As more LDCs follow India to the nuclear explosive level, the North-South division of nuclear weapon states and non-nuclear weapons states will begin to blur: a growing percentage of "nuclear" states will also be LDCs. If such states can be kept within the framework of international agreements and included in discussions

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on proliferation issues, some of the political incentives to weaponization and to further proliferation itself may be reduced.

International agreements and usage now make no legal distinction between possession of explosives and possession of deliverable weapons; Peaceful Nuclear Explosions (PNEs) are not permitted non-nuclear weapons states under the NPT agreement. The UK has, however, suggested, and received some support from other nuclear states, that PNEs be excluded from weapons categories. Legal recognition of a distinction between explosives and weapons might encourage some threshold states not to advance to weaponization. States that acquire explosives would then remain within the framework of international agreements, benefits, and obligations. A state which acquires explosives -- as many Nth states seem likely to do over the next decade -- must now either be a non-signatory, renounce the agreement, or violate it.

PNEs are a political euphemism; there is little evidence that they hold any advantage over more mundane explosives and considerable evidence of their disutility in industrial uses.* PNEs are, however, a convenient badge of a nuclear status which aspiring nations cannot be prevented from attaining. Given the current conditions of nuclear

*Among nuclear weapon states, the USSR maintains a minority view that PNEs do have an industrial utility and is continuing a research program on their commercial use. Although the US and the USSR have considered providing PNE services to third world countries, this service has yet to be requested.

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politics, legitimization of the PNEs might establish a category of states which could enjoy some of the prestige of "nuclear status" but still be bound by agreements not to develop, or to threaten to develop their nuclear capacity as a weapon.

Finally, the major powers will retain considerable influence over the diffusion of major advances in nuclear and especially in military technology. Agreements among suppliers of nuclear missile delivery systems to restrict availability could also be a significant factor in limiting the number of Nth states that advance to this level of proliferation. At present, there is every prospect that the current difficulties in achieving arrangements in restraint of proliferation among nuclear power exporters will be duplicated in the future among suppliers of missile systems. The intense competition in the conventional arms trade among the several advanced countries capable of producing modern weapons may very well generate equivalent market pressures that will make proliferation of delivery systems and relevant technologies far more likely. The myriad of superpower client states that may acquire such systems through military aid exacerbates the problem still further. By the same token, proliferation might be slowed if individual Nth countries and their probable enemies believed that the suppliers of defenses against missiles would make them readily available.

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V. PROSPECTS

It seems fairly clear that the world will have to cope with a growing number of nuclear actors. The only certain prediction about the future course of nuclear proliferation is that it will produce a greater diversity of nuclear actors than presently exists. The gradations of nuclear superpowers, regional nuclear powers, nuclear abstainers, closet nuclear powers, nuclear explosives powers, and, possibly, nuclear terrorists will complicate the earlier distinction between nuclear weapons states and non-nuclear weapons states. The more states that remain at the explosives stage -- either because delivery systems are too difficult to attain or because their utility is severely limited -- the greater the prospects that the proliferation process will not seriously alter international power relations.

The complexity of future nuclear politics will almost certainly include states which will exploit their threshold positions, as much or more than their actual capabilities. Such instances are not unknown at present -- Pakistan has sought to gain more conventional armament assistance on the plea that it must otherwise face the "necessity" of nuclear weapons. Such cases are, likely to become more common as it becomes increasingly difficult for Nth states to gain real political advantages from crossing successive thresholds.

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For the same reason, there are also likely to be more Nth states which leave their nuclear status purposely ambiguous.

If this were to become not merely more common but prevalent, the rate of proliferation discussed above would be a less important dynamic, since it would itself be ambiguous and threshold states would react to the suspicion rather than the demonstrated certainty of nuclear debuts.

While there is no hope of preventing nuclear proliferation in the sense of controlling the number of nuclear actors, it will be possible to influence the kinds of nuclear actors that emerge -- and the kinds of new nuclear actors may be far more important than their numbers. Prospects for influencing the kinds of new nuclear actors will increase at the point where new nuclear explosives states must consider the limited opportunities and uncertain incentives for acquiring delivery capabilities. These decisions will depend on a variety of conditions which the great powers are likely to be able to affect, e.g., the pace of proliferation; the availability of delivery and defense systems to Nth states and their potential targets; and the status of PNEs within international legal and political arrangements.

The most hopeful prospect is that the great majority of threshold states will advance only as far as nuclear explosives. The profile of nuclear actors would then be a pyramid having a

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very broad base: most of the new entrants would remain at the lowest capabilities. The most dangerous prospect for future proliferation would be simultaneous conditions of high opportunity and high incentive when today's threshold states have become tomorrow's nuclear explosives powers and must determine whether they will move to full delivery systems. The commercial competition among exporters of nuclear power supplies might then be replaced by an equal competition among suppliers of sophisticated delivery systems. Political incentives attached to the status of nuclear explosives capabilities would then be replaced by strong incentives to acquire demonstrable delivery capabilities. The coming decade of nuclear politics would then move the ante up from nuclear explosives to effective nuclear weapons.

In sum, while nuclear proliferation is uniformly undesirable, some of its aspects seem more dangerous, and more avoidable, than others. The speed at which the process advances and the level of sophistication which Nth states attain will probably be the most critical factors, as well as those subject to the most outside influence.

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